

1       What is claimed is:

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3           1. An encoding system for determining position and position changes of  
4       a moving member, comprising:

5               a sequence of encoder marks forming incremental patterns and at least  
6       one index pattern, wherein two subsequent incremental patterns are indica-  
7       tive of an incremental position-change of the moving member and the index  
8       pattern is indicative of a reference position of the moving member;

9               a sensor arrangement viewing a section of the encoder-mark sequence,  
10      the length of which is greater than one position-change increment;

11               an analyzer arranged to analyze an encoder-mark pattern in the viewed  
12      section with regard to the incremental patterns and the index pattern and to  
13      generate, in response to a pattern match found, at least one of an incre-  
14      mental-position-change signal and an index signal.

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16               2. The encoding system of claim 1, wherein the sensor arrangement  
17      comprises a plurality of sensor elements arranged to simultaneously detect a  
18      plurality of encoder marks in the section of the encoder-mark sequence.

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20               3. The encoding system of claim 1, wherein the index pattern has a  
21      length, and the length of the viewed section corresponds to the length of the  
22      index pattern.

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24               4. The encoding system of claim 1, wherein subsequent incremental  
25      patterns overlap.

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27               5. The encoding system of claim 1, wherein the encoder marks are iden-  
28      tical.

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30               6. The encoding system of claim 1, wherein the system is a linear or an  
31      angular encoding system.

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1        7. An encoding system for determining position and position changes of  
2 a moving member, comprising:

3            a row of encoder marks arranged along the moving member in a gener-  
4 ally regular manner to provide incremental position-change information;

5            at least one index marking in the form of a predefined pattern of encoder  
6 marks which represents a disturbance of the regular encoder-mark arrange-  
7 ment;

8            a sensor arrangement viewing a section of the row of encoder marks  
9 and arranged to provide a viewed pattern of the encoder-mark section;

10          an analyzer arranged to analyze the viewed pattern to generate incre-  
11 mental-position-change signals on the basis of the encoder marks and an  
12 index signal in response to a detection of the predefined index mark pattern,

13          wherein the incremental-position-change signals are enabled to be gen-  
14 erated also in that section of the encoder-mark row in which the regular en-  
15 coder-mark arrangement is disturbed by the index marking.

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17          8. The encoding system of claim 7, wherein the sensor arrangement  
18 comprises a plurality of sensor elements arranged to simultaneously detect a  
19 plurality of encoder marks in the viewed encoder-mark section.

20

21          9. The encoding system of claim 7, wherein the index marking has a  
22 length, and the length of the viewed encoder-mark section corresponds to the  
23 length of the index marking.

24

25          10. The encoding system of claim 7, wherein the sensor arrangement is  
26 arranged to detect, in the viewed section, a multiplicity of encoder marks, so  
27 that the detected encoder marks carry redundant incremental position-change  
28 information at least in regions of regular encoder-mark arrangement, wherein  
29 the detection of the multiplicity of encoder marks enables the incremental-  
30 position-change signals to be generated also in that section of the encoder-  
31 mark row in which the regular encoder-mark arrangement is disturbed by the  
32 index marking.

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1        11. The encoding system of claim 7, wherein the encoder marks are  
2 equidistantly spaced in regions of regular encoder-mark arrangement.

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4        12. The encoding system of claim 7, wherein the encoder marks are  
5 identical.

6

7        13. The encoding system of claim 1, wherein the system is a linear or an  
8 angular encoding system.

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10       14. An encoding system for determining position and position changes  
11 of a moving member, comprising:

12            a row of identical encoder marks forming incremental patterns and at  
13 least one index pattern, wherein two subsequent incremental patterns are  
14 indicative of an incremental position-change of the moving member and the  
15 index pattern is indicative of a reference position of the moving member;

16            a sensor arrangement detecting a pattern of a section of the encoder-  
17 mark row;

18            an analyzer arranged to analyze the detected encoder-mark pattern with  
19 regard to the incremental patterns and the index pattern and to generate, in  
20 response to an incremental-pattern match found, an incremental-position-  
21 change signal and, in response to an index-pattern match found, an index  
22 signal.

23

24        15. The encoding system of claim 14, wherein the sensor arrangement  
25 comprises a plurality of sensor elements arranged to simultaneously detect a  
26 plurality of encoder marks in the section of the encoder-mark row.

27

28        16. The encoding system of claim 14, wherein the index pattern has a  
29 length, and the length of the viewed section corresponds to the length of the  
30 index pattern.

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1        17. The encoding system of claim 14, wherein the sensor arrangement  
2 comprises a sensor element arranged to successively detect the encoder  
3 marks or groups of the encoder marks in the section of the encoder-mark row  
4 upon the movement of the moving member, wherein the encoding system is  
5 arranged to combine the successively detected encoder marks to form the  
6 detected encoder-mark pattern.

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8        18. The encoding system of claim 14, wherein subsequent incremental  
9 patterns overlap.

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11        19. The encoding system of claim 14, wherein the system is a linear or  
12 an angular encoding system.

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14        20. A printing device having an encoding system for determining position  
15 and position changes of a recording medium conveyor to determine the position  
16 of a recording medium placed on the conveyor, comprising:

17            a sequence of encoder marks forming incremental patterns and at least  
18 one index pattern, wherein two subsequent incremental patterns are indica-  
19 tive of an incremental position-change of the conveyor and the index pattern  
20 is indicative of a reference position of the conveyor;

21            a sensor arrangement viewing a section of the encoder-mark sequence,  
22 the length of which is greater than one position-change increment;

23            an analyzer arranged to analyze an encoder-mark pattern in the viewed  
24 section with regard to the incremental patterns and the index pattern and to  
25 generate, in response to a pattern match found, at least one of an incre-  
26 mental-position-change signal and an index signal.

27

28        21. The printing device of claim 20, wherein the recording medium con-  
29 veyor is a belt conveyor.

30

31        22. The printing device of claim 20, wherein the encoder-mark sequence  
32 is an encoder-mark row arranged along the recording medium conveyor.

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1        23. The printing device of claim 20, wherein the printing device has a  
2 plurality of print stations arranged along the recording medium conveyor, and  
3 each print station is individually equipped with said sensor arrangement and  
4 analyzer.

5

6        24. The printing device of claim 20, wherein the printing device is a  
7 page-wide ink-jet printer.

8

9        25. A printing device having an encoding system for determining position  
10 and position changes of a recording medium conveyor to determine the posi-  
11 tion of a recording medium placed on the conveyor, comprising:

12        a row of encoder marks arranged along the conveyor in a generally  
13 regular manner to provide incremental position-change information;

14        at least one index marking in the form of a predefined pattern of encoder  
15 marks which represents a disturbance of the regular encoder-mark arrange-  
16 ment;

17        a sensor arrangement viewing a section of the row of encoder marks  
18 and arranged to provide a viewed pattern of the encoder-mark section;

19        an analyzer arranged to analyze the viewed pattern to generate incre-  
20 mental-position-change signals on the basis of the encoder marks and an  
21 index signal in response to a detection of the predefined index mark pattern,

22        wherein the incremental-position-change signals are enabled to be gen-  
23 erated also in that section of the encoder-mark row in which the regular en-  
24 coder-mark arrangement is disturbed by the index marking.

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26        26. The printing device of claim 25, wherein the recording medium con-  
27 veyor is a belt conveyor.

28

29        27.. The printing device of claim 25, wherein the printing device has a  
30 plurality of print stations arranged along the recording medium conveyor, and  
31 each print station is individually equipped with said sensor arrangement and  
32 analyzer.

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1        28. The printing device of claim 25, wherein the printing device is a  
2 page-wide ink-jet printer.

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4        29. A printing device having an encoding system for determining position  
5 and position changes of a recording medium conveyor to determine the posi-  
6 tion of a recording medium placed on the conveyor, comprising:

7              a row of identical encoder marks forming incremental patterns and at  
8 least one index pattern, wherein two subsequent incremental patterns are  
9 indicative of an incremental position-change of the conveyor and the index  
10 pattern is indicative of a reference position of the conveyor;

11             a sensor arrangement detecting a pattern of a section of the encoder-  
12 mark row;

13             an analyzer arranged to analyze the detected encoder-mark pattern with  
14 regard to the incremental patterns and the index pattern and to generate, in  
15 response to an incremental-pattern match found, an incremental-position-  
16 change signal and, in response to an index-pattern match found, an index  
17 signal.

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19        30. The printing device of claim 29, wherein the recording medium con-  
20 veyor is a belt conveyor.

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22        31. The printing device of claim 30, wherein the encoder-mark row is ar-  
23 ranged along the recording medium conveyor.

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25        32. The printing device of claim 30, wherein the printing device has a  
26 plurality of print stations arranged along the recording medium conveyor, and  
27 each print station is individually equipped with said sensor arrangement and  
28 analyzer.

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30        33. The printing device of claim 30, wherein the printing device is a  
31 page-wide ink-jet printer.

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1       34. A method of determining position and position changes of a moving  
2 member using a sequence of encoder marks which forms incremental pat-  
3 terns and at least one index pattern, wherein two subsequent incremental  
4 patterns are indicative of an incremental position-change of the moving mem-  
5 ber and the index pattern is indicative of a reference position of the moving  
6 member, comprising the steps:

7             viewing a section of the encoder-mark sequence, the length of which is  
8 greater than one position-change increment;

9             analyzing a encoder-mark pattern in the viewed section with regard to  
10 the incremental patterns and the index pattern; and

11             generating, in response to a pattern match found, at least one of an  
12 incremental-position-change signal and an index signal.

13

14       35. A method of determining position and position changes of a moving  
15 member using a row of encoder marks arranged along the moving member in  
16 a generally regular manner to provide incremental position-change informa-  
17 tion; at least one index marking in the form of a predefined pattern of encoder  
18 marks which represents a disturbance of the regular encoder-mark arrange-  
19 ment, comprising the steps:

20             viewing a section of the row of encoder marks;

21             providing a viewed pattern of the encoder-mark section;

22             analyzing the viewed pattern to generate incremental-position-change  
23 signals providing the incremental position-change information on the basis of  
24 the encoder marks and an index signal in response to a detection of the pre-  
25 defined index mark pattern,

26             wherein the incremental-position-change signals are enabled to be gen-  
27 erated also in that section of the encoder-mark row in which the regular en-  
28 coder-mark arrangement is disturbed by the index marking.